

CLAIMS

What is claimed is:

- 1 1. An apparatus comprising:
 - 2 an estimating unit to estimate a distribution of input signal level; and
 - 3 an integrator to adjust a gain based upon the distribution for an automatic gain
 - 4 control.
- 1 2. The apparatus of claim 1, wherein the estimating unit comprises:
 - 2 a comparator to compare the input signal against one or more reference
 - 3 threshold values; and
 - 4 a counter to estimate the distribution by counting occurrences in which the input
 - 5 signal level is either above or below the one or more reference threshold values within
 - 6 a given period.
- 1 3. The apparatus of claim 2, wherein:
 - 2 the comparator compares the input signal level against a first reference
 - 3 threshold value and a second threshold value; and
 - 4 the counter counts occurrences in which the input signal level is above the first
 - 5 reference threshold value and occurrences in which the input signal level is below the
 - 6 second reference threshold value.
- 1 4. The apparatus of claim 3, wherein the first reference threshold value is higher
- 2 than the second reference threshold value.
- 1 5. The apparatus of claim 4, wherein the counter counts up when the input signal
- 2 level is above the first reference threshold value and counts down when the input signal
- 3 level is below the second reference threshold value.
- 1 6. The apparatus of claim 2, wherein the integrator adjusts the gain based upon the
- 2 occurrences counted during the given period.

1 7. The apparatus of claim 2, wherein the estimating unit further comprises a
2 variable step size generator, and wherein:

3 the counter to determine a percentage of time that the input signal level is either
4 above or below the one or more reference threshold values within the given period, and
5 generates an error signal;

6 the variable step size generator to select a step size factor based upon the error
7 signal and to multiply the error signal with the selected step size factor to generate a
8 variable error signal; and

9 the integrator to adjust the gain in accordance with the variable error signal.

1 8. The apparatus of claim 7, wherein the variable step size generator selects a large
2 step size factor if the error signal is above a predetermined value.

1 9. The apparatus of claim 1, further comprising a variable step size generator to
2 vary the speed by which the integrator adjusts the gain by gear shifting based upon the
3 distribution.

1 10. A method comprising:

2 estimating a distribution of input signal level; and

3 adjusting a gain based upon the distribution for an automatic gain control.

1 11. The method of claim 10, wherein estimating the distribution comprises:

2 comparing the input signal level against one or more reference threshold values;

3 and

4 estimating the distribution by counting occurrences in which the input signal
5 level is either above or below the one or more reference threshold values within a given
6 period.

1 12. The method of claim 11, wherein:

2 comparing the input signal level against a first reference threshold value and a
3 second threshold value; and

4 counting occurrences in which the input signal level is above the first reference
5 threshold value and occurrences in which the input signal level is below the second
6 reference threshold value.

1 13. The method of claim 12, wherein the first reference threshold value is higher
2 than the second reference threshold value.

1 14. The method of claim 13, wherein counting up when the input signal level is
2 above the first reference threshold value and counting down when the input signal level
3 is below the second reference threshold value.

1 15. The method of claim 11, wherein adjusting the automatic gain control based
2 upon the occurrences counted during the given period.

1 16. The method of claim 11, wherein estimating the distribution further comprises:
2 determining a percentage of time that the input signal level is either above or
3 below the one or more reference threshold values within the given period, and
4 generating an error signal;
5 selecting a step size factor based upon the error signal and multiplying the error
6 signal with the selected step size factor to generate a variable error signal; and
7 adjusting the gain in accordance with the variable error signal.

1 17. The method of claim 16, wherein selecting a large step size factor if the error
2 signal is above a predetermined value.

1 18. The method of claim 10, further comprising varying the speed by which the
2 gain is adjusted by gear shifting based upon the distribution.

1 19. An instruction loaded in a machine readable medium comprising:
2 a first group of instructions to estimate a distribution of input signal level; and
3 a second group of instruction to adjust a gain based upon the distribution for an
4 automatic gain control.

1 20. The instruction of claim 19, wherein the first group of instructions comprises:
2 a third group of instructions to compare the input signal level against one or
3 more reference threshold values; and
4 a fourth group of instructions to estimate the distribution by counting
5 occurrences in which the input signal level is either above or below the one or more
6 reference threshold values within a given period.

1 21. The instruction of claim 20, wherein:
2 the third group of instructions include instructions to compare the input signal
3 level against a first reference threshold value and a second threshold value; and
4 the fourth group of instructions include instructions to count occurrences in
5 which the input signal level is above the first reference threshold value and occurrences
6 in which the input signal level is below the second reference threshold value.

1 22. The instructions of claim 20, wherein the first group of instructions further
2 comprises a fifth group of instructions, and wherein:
3 the fourth group of instructions to determine a percentage of time that the input
4 signal level is either above or below the one or more reference threshold values within
5 the given period, and generating an error signal;
6 the fifth group of instructions to select a step size factor based upon the error
7 signal and to multiply the error signal with the selected step size factor to generate a
8 variable error signal; and
9 the second group of instructions to adjust the gain in accordance with the
10 variable error signal.

1 23. The instruction of claim 19, further comprising a third group of instructions to
2 vary the speed by which the gain is adjusted by gear shifting based upon the
3 distribution.

1 24. A communication system comprising:
2 a transmitter to transmit an analog signal;

3 a receiver to receive the analog signal, the receiver including an automatic gain
4 control unit to maintain a constant level of the analog signal for processing in the
5 receiver, the automatic gain control unit including:

6 an estimating unit to estimate a distribution of input signal level; and
7 an integrator to adjust a gain based upon the distribution for the
8 automatic gain control.

1 25. The communication system of claim 24, wherein the estimating unit comprises:
2 a comparator to compare the input signal level against one or more reference
3 threshold values; and

4 a counter to estimate the distribution by counting occurrences in which the input
5 signal level is either above or below the one or more reference threshold values within
6 a given period.

1 26. The communication system of claim 25, wherein:
2 the comparator compares the input signal level against a first reference
3 threshold value and a second threshold value; and
4 the counter counts occurrences in which the input signal level is above the first
5 reference threshold value and occurrences in which the input signal level is below the
6 second reference threshold value.

1 27. The communication system of claim 26, wherein the first reference threshold
2 value is higher than the second reference threshold value.

1 28. The communication system of claim 25, wherein the automatic gain control unit
2 further comprises a variable step size generator, and wherein:
3 the counter determines a percentage of time that the input signal level is either
4 above or below the one or more reference threshold values within the given period, and
5 generate an error signal;

6 the variable step size generator selects a step size factor based upon the error
7 signal and multiplies the error signal with the selected step size factor to generate a
8 variable error signal; and

9 the integrator adjusts the gain in accordance with the variable error signal.

1 29. An automatic gain control apparatus comprising:
2 a comparator to compare input signal level against one or more reference
3 threshold values;
4 a counter to count occurrences in which the input signal level is either above or
5 below the one or more reference threshold values within a given period; and
6 an integrator to adjust a gain for automatic gain control, the gain adjusted based
7 upon the occurrences counted.

1 30. The apparatus of claim 29, wherein:
2 the comparator compares the input signal level against a first reference
3 threshold value and a second threshold value; and
4 the counter counts occurrences in which the input signal level is above the first
5 reference threshold value and occurrences in which the input signal level is below the
6 second reference threshold value.

1 31. The apparatus of claim 30, wherein the first reference threshold value is higher
2 than the second reference threshold value.

1 32. The apparatus of claim 31, wherein the counter counts up when the input signal
2 level is above the first reference threshold value and counts down when the input signal
3 level is below the second reference threshold value.

1 33. The apparatus of claim 29, further comprising a variable step size generator, and
2 wherein:
3 the counter determines a percentage of time that the input signal level is either
4 above or below the one or more reference threshold values within the given period, and
5 generate an error signal;
6 the variable step size generator selects a step size factor based upon the error
7 signal and multiplies the error signal with the selected step size factor to generate a
8 variable error signal; and
9 the integrator adjusts the gain in accordance with the variable error signal.

- 1 34. A method for automatic gain control comprising:
 - 2 comparing input signal level against one or more reference threshold values;
 - 3 counting occurrences in which the input signal level is either above or below the
 - 4 one or more reference threshold values within a given period; and
 - 5 adjusting a gain for automatic gain control based upon the occurrences counted.

- 1 35. The method of claim 34, wherein:
 - 2 comparing the input signal level against a first reference threshold value and a
 - 3 second threshold value; and
 - 4 counting occurrences in which the input signal level is above the first reference
 - 5 threshold value and occurrences in which the input signal level is below the second
 - 6 reference threshold value.

- 1 36. The method of claim 34, wherein further comprising varying the speed by
2 which the gain is adjusted by gear shifting based upon the distribution.